MAINE DEPARTMENT OF TRANSPORTATION
PRODUCT ACCEPTANCE CRITERIA FOR

Macro-Synthetic Fibers for Concrete Reinforcement

General Description

This section includes the requirements for acceptance of macro-synthetic fibers which are permitted as a replacement for 6" x 6", #10 gauge welded wire fabrics reinforcement in the following selected precast concrete products:

Precast concrete manhole and catch basin units as allowed under MaineDOT Standard Specification, 712.06 Precast Concrete Units.

Requirements

The fiber manufacturer is required to obtain independently-performed test results that confirm the requirements listed below and submit those for approval by the Maine Department of Transportation's Product Approval Committee.

1. Macro-synthetic fibers are manufactured from virgin polyolefins (polypropylene and polyethylene) and comply with ASTM C 1116.4.1.3. Fibers manufactured from materials other than polyolefins must show documentary evidence confirming their long term resistance to deterioration when in contact with the moisture and alkalies present in cement paste and/or the substances present in air-entraining and chemical admixtures.

2. The minimum fiber length required is 1.50 in (38 mm).

3. Macro-synthetic fibers have an aspect ratio (length divided by the equivalent diameter of the fiber) between 45 and 150.

4. Macro-synthetic fibers have a minimum tensile strength of 40 ksi (276 MPa) when tested in accordance with ASTM D 3822.

5. Minimum dosage rate in pounds of fibers per cubic yard is established by determining a minimum average residual strength of no less than 150 psi (1034 kPa) when tested in accordance with ASTM C 1399. In all cases, ensure a minimum fiber dosage rate of 5 lbs/yd3 (2.9 kg/m3) and a maximum fiber dosage rate of 10 lbs/yd3 (5.9 kg/m3).

6. Ensure that macro-synthetic fibers have a minimum modulus of elasticity of 400 ksi (2758 MPa) when tested in accordance with ASTM D 3822.

7. Fiber reinforced concrete shall contain 6% air content, plus or minus 1½% tolerance.

8. Fiber reinforced concrete shall develop a minimum compressive strength of 3000 psi [20 Mpa] in 7 days or 4000 psi [28 Mpa] in 28 days.

Fibers meeting all of the above criteria will be added to the Department's "Approved Products List of Structural Fiber Reinforcement."

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